

Growth and properties of single- and multi-layer silicene

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Silicene, a novel silicon allotrope, which does not exist in nature, was theoretically conjectured a few years ago [1] as a stand-alone material. However, for the synthesis of silicene a substrate material is essential that prevents the formation of bulk silicon and, at the same time, does not react with the Si-atoms. Recently, silicene layers could be synthesized on different substrates such as Ag(111), Ir(111) or ZrB₂ and experimentally investigated [2]. This new form of silicon shows strong similarities to graphene but also differs in certain aspects, such as the hybridization state of the Si atoms and the related buckling within honeycomb arrangement.

In this talk the epitaxial formation of single layer silicene on a Ag(111) substrate will be discussed, including its structural and electronic properties and the interaction with the Ag substrate. Based on these results the formation of multilayer silicene will be discussed that forms upon further deposition of Si onto the first silicene layer. The formation of silicene multi-layer structure could open new possibilities to solve one puzzling problem for the technological applicability.

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